

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Currently Amended) A semiconductor device, comprising:
 - a drain electrode;
 - a source electrode;
 - a channel contacting the drain electrode and the source electrode, wherein the channel includes a single-phase crystalline gallium oxide Ga_2O_3 with dopant selected from a group consisting of oxygen vacancies, Si, Ge, Sn, and N;
 - a gate electrode; and
 - a gate dielectric positioned between the gate electrode and the channel.
2. (Canceled) The semiconductor device of claim 1, wherein gallium oxide includes a single-phase crystalline form selected from the group consisting of GaO, Ga_2O , and Ga_2O_3 .
3. (Currently Amended) The semiconductor device of claim 1, wherein gallium oxide includes a single-phase crystalline form of $\beta\text{-Ga}_2\text{O}_3$ with dopant selected from a group consisting of oxygen vacancies, Si, Ge, Sn, and N.
4. (Withdrawn) The semiconductor device of claim 1, wherein gallium oxide includes a mixed-phase crystalline form from compounds selected from the group consisting of GaO, Ga_2O , Ga_2O_3 , and mixtures thereof.
5. (Withdrawn) The semiconductor device of claim 4, wherein gallium oxide includes $\text{GaO}:\text{Ga}_2\text{O}:\text{Ga}_2\text{O}_3$ in a ratio of A:B:C, wherein A, B, and C are each in a range of about 0.025 to about 0.95.

6. (Withdrawn) The semiconductor device of claim 1, wherein gallium oxide includes an amorphous form from compounds selected from the group consisting of GaO, Ga₂O, Ga₂O₃, and mixtures thereof.

7. (Original) The semiconductor device of claim 1, wherein the channel includes being positioned between and electrically coupling the drain electrode and the source electrode.

8. (Original) The semiconductor device of claim 1, wherein at least one of the drain electrode, the source electrode, the channel, gate electrode, the gate dielectric, and combinations thereof are substantially transparent.

9. (Currently Amended) A semiconductor device, comprising:
a drain electrode;
a source electrode;
means for carrying electron flow to electrically couple the drain electrode and the source electrode, wherein the means for a channel includes means for a single-phase crystalline form of Ga₂O₃ with dopant selected from a group consisting of oxygen vacancies, Si, Ge, Sn, and N;
a gate electrode; and
a gate dielectric positioned between the gate electrode and the channel.

10. (Canceled) The semiconductor device of claim 9, wherein the means for a channel includes means for a single-phase crystalline form selected from the group consisting of GaO, Ga₂O, and Ga₂O₃.

11. (Currently Amended) The semiconductor device of claim 9, wherein the means for a channel includes a single-phase crystalline form of β -Ga₂O₃ with dopant selected from a group consisting of oxygen vacancies, Si, Ge, Sn, and N.

12. (Withdrawn) The semiconductor device of claim 9, wherein the means for a channel includes means for forming a mixed-phase crystalline form from compounds selected from the group consisting of GaO, Ga₂O, Ga₂O₃, and mixtures thereof.

13. (Withdrawn) The semiconductor device of claim 9, wherein the means for a channel includes means for forming an amorphous form from compounds selected from the group consisting of GaO, Ga₂O, Ga₂O₃, and mixtures thereof.

14. (Original) The semiconductor device of claim 9, wherein at least one of the drain electrode, the source electrode, the channel, gate electrode, the gate dielectric, and combinations thereof are substantially transparent.

15-27. (Canceled)

28. (Currently Amended) A semiconductor device formed by the steps, comprising:

providing a drain electrode;

providing a source electrode;

providing a precursor composition including one or more compounds of a gallium precursor compound, wherein the means for a channel includes means for a single-phase crystalline form of Ga₂O₃ with dopant selected from a group consisting of oxygen vacancies, Si, Ge, Sn, and N;

depositing a channel of gallium oxide from the precursor composition to contact the drain electrode and the source electrode;

providing a gate electrode; and

providing a gate dielectric positioned between the gate electrode and the channel.

29. (Original) The semiconductor device of claim 28, wherein depositing the channel includes:

vaporizing the precursor composition to form vaporized precursor composition; and

depositing the vaporized precursor composition using a physical vapor deposition technique.

30. (Currently Amended) The semiconductor device of claim 29 28, wherein the physical vapor deposition technique includes one or more of dc sputtering, rf sputtering, magnetron sputtering, and ion beam sputtering.

31.-33. (Canceled)

34. (Currently Amended) A display device, comprising:

a plurality of display elements configured to operate collectively to display images, where each of the display elements includes a semiconductor device configured to control light emitted by the display element, the semiconductor device including:

a drain electrode;

a source electrode;

a channel contacting the drain electrode and the source electrode,

wherein the channel includes a single-phase crystalline gallium oxide Ga_2O_3 with dopant selected from a group consisting of oxygen vacancies, Si, Ge, Sn, and N;

a gate electrode; and

a gate dielectric positioned between the gate electrode and the channel and configured to permit application of an electric field to the channel.

35. (Canceled) The display device of claim 34, wherein gallium oxide includes a single-phase crystalline form selected from the group consisting of GaO, Ga_2O , and Ga_2O_3 .

36. (Currently Amended) The display device of claim 34, wherein gallium oxide includes a single-phase crystalline form of $\beta\text{-Ga}_2\text{O}_3$ with dopant selected from a group consisting of oxygen vacancies, Si, Ge, Sn, and N.

37. (Withdrawn) The display device of claim 34, wherein gallium oxide includes a mixed-phase crystalline form from compounds selected from the group consisting of GaO, Ga₂O, Ga₂O₃, and mixtures thereof.

38. (Withdrawn) The display device of claim 37, wherein gallium oxide includes GaO:Ga₂O:Ga₂O₃ in a ratio of A:B:C, wherein A, B, and C are each in a range of about 0.025 to about 0.95.

39. (Withdrawn) The display device of claim 34, wherein gallium oxide includes an amorphous form from compounds selected from the group consisting of GaO, Ga₂O, Ga₂O₃, and mixtures thereof.

40. (Original) The display device of claim 34, wherein at least one of the drain electrode, the source electrode, the channel, gate electrode, the gate dielectric, and combinations thereof are substantially transparent.